

**Remarks/Arguments:**

**Remarks on the Prior Art Publications on Soil Blending:**

Claims 1-15 were rejected under 35 U.S.C. §103. The current amendment cancels claims 4, 5, 8, 9, 10, 14 and 15. Claims 1-3, 6, and 11-13 remain pending under rejection, but have been amended. Support for the amendments is found at paragraph [0031] of the application.

This communication will address why the pending claims, including those currently amended, are not obvious in view of the cited art. However, to accelerate prosecution this communication will also address a reference not cited in the Office Action, but disclosed in a supplemental IDS filed February 24, 2005. The reference is titled "*Guidelines for the Vertical Mixing of Soil on Former Broad-Acre Agricultural Land*", published by the New South Wales Environmental Protection Agency (hereafter "the NSW document"). The Applicant believes that the NSW document pre-dates and discloses all relevant information in the New Jersey document cited in the Office Action, but goes beyond the New Jersey document by disclosing vertical mixing as a method of reducing surface layer contamination. It would be time wasting to traverse the rejections by pointing out that the New Jersey document does not disclose or suggest vertical mixing, without simultaneously discussing why the claim is not obvious in view of the NSW document. Hence, this response will traverse each ground for rejection, but will further state why the claim is not obvious in view of the NSW document.

The New Jersey document is significant in that it recommends that the Department permit blending of clean soil into pesticide contaminated soil as a method of remediation for former agricultural sites (see pages 24 and 25), but it does not teach or suggest vertical mixing as a mode of blending. Blending as contemplated by the New Jersey document could be done by

excavation and mixing with clean soil in stockpiles, or by lateral mixing by dozers or agricultural machinery such as plows, hoes or disc harrows . The only specific protocol listed in the New Jersey document is for using off-site soil to mix with the contaminated soil (Addendum 4, pages 41-42). There is nothing in the New Jersey document to suggest that the most convenient source of clean soil may be the deep soil underlying the contaminated layer. In fact the New Jersey document teaches away from vertical mixing in explaining both Remedial Options 3 and 4, where it cautions that blending may not be practical when contaminant levels are high because large amounts of clean soil would be needed ( see page 24). This cautionary remark implies that the clean soil will be imported from other areas of the site or from off-site, not mixed upward from below the contaminated layer.

The NSW document, however, does expressly recognize the advantage of remediating contaminated surface soil by vertical mixing with cleaner soils found at greater depth (see Introduction, page 1). It describes the vertical mixing process at pages 4-5 , and vertical mixing trials on page 6. The trials were conducted by dozer ripping, sometimes followed by rotary hoe mixing or blade mixing. Using these machines they were able to achieve homogenous distribution of the contaminant below the health threshold.

The NSW document notes on page 5, however, that “other machinery may give equivalent or better vertical mixing results”, but it does not suggest any particular other machinery. It also cautions that the vertical mixing process may need to be repeated to ensure effective mixing and achievement of the clean-up goal.

In the section entitled “PREREQUISITES FOR USING VERTICAL MIXING” , pages 7-11, the NSW document describes making a remediation plan for vertical mixing by identifying

types of contaminant and the vertical profile of contamination, and determining whether there is sufficient depth of clean subsurface soil for vertical mixing by applying a mass balance equation to determine required mixing depth. On page 8, the NSW document identifies as the third prerequisite that "The soil that needs to be vertically mixed is not more than 0.5 metre deep", explaining that homogenization to a depth greater than 0.5 metre may be difficult to achieve. Consequently, the example given for determining mixing depth with the mass balance equation considers a surface layers of 100 mm (roughly 4 inches) contaminated with both arsenic and dieldrin, and results in mixing depths of 224 mm (8.8 inches) for dieldrin and 337.5 mm (13.3 inches) for arsenic. These depths are within the document's prerequisite range of not exceeding 0.5 metre (19.6 inches) .

The current amendments recite that the soil is vertically mixed by a mobile trencher apparatus modified to lift and churn soil in place to a depth of at least four feet (1.2 metre). The use of such device is not taught or suggested by the NSW document, which regards 0.5 metre as the limiting depth for vertical mixing.

**Declaration Under 37 C.F.R. 1.132 of Eric B. Schmidley P. G.**

Also filed with this response is the Declaration Under 37 C.F.R. 1.132 of Eric B. Schmidley P. G., a Professional Geologist and Program Manager of a company specializing in environmental consulting and remediation services. Mr Schmidley is familiar with the New Jersey document cited as prior art and with regulatory provisions in several states which permit remediation of pesticide contaminated soil in agricultural sites to permit residential land use. He recounts his unsuccessful experience in trying soil blending by removing and stockpiling the top 12-18 inches of soil from the site during construction, then redistributing the soil (having been

mixed by the removal and stockpiling) because the test plot showed that such blending would not reduce concentration to the health threshold. He realized that to use this removal and redistribute blending method for the site would have required importing a large volume of clean soil.

Consequently, Mr. Schmidley asked the Applicant to demonstrate whether his company could do the remediation at less cost. His declaration describes that the Applicant sent a modified track trencher called a MITU LVR (large volume remediator, as described in US Patent 6,543,963) and explained to him that the machine was modified so that the soil would not be excavated to form a trench, but instead the machine would lift and churn the soil until it was uniformly blended in the vertical zone of the rotating teeth.

As Mr. Schmidley attests, the Applicant's company demonstrated the modified trencher machine in test pits ranging from 7 to 13.5 feet deep. Mr. Schmidley was surprised to see how deeply the machine could reach to blend soil. The post-blending samples taken from each pit showed contaminant concentration well below the 12mg/kg threshold. He then contracted the Applicant's company to remediate the site. The project was successfully completed in short time at far less cost than importing clean fill.

### **Response to the Rejections under 35 U.S.C. § 103**

Turning now to the specific grounds for rejection; the Examiner rejected claims 1-3 and 6-15 as obvious over Bruso '752 in view of the New Jersey document. The Examiner describes Bruso '752 as teaching the step of employing a mobile blending apparatus to vertically mix soil to reduce the concentration of contaminants, but Bruso '752 does not teach this step. Bruso 752 is an earlier invention of the Applicant in which the modified trencher is used to lift and comminute soil while a remediation fluid is injected into the soil through injection nozzles close

to the trencher tool. The purpose of lifting and comminuting the soil is to allow the injected remediation fluid to be distributed evenly throughout the depth of the tool, but the reference does not teach or suggest reducing the concentration of contaminant by vertical mixing of a contaminated surface layer with clean underlying soil. Thus, while the '752 apparatus does vertically mix soil, the mode of remediation is one of vertically mixing with an injected reagent.

Another of the Applicant's devices, noted by the Examiner on the form 1449, but not cited as grounds for rejection, is US 6,543,963. This large volume trencher apparatus was used in the remediation project described by Mr. Schmidley. This '693 patent is even more explicit than the '752 patent about the process of lifting, breaking down and churning the soil, and disclosed patterns of location and orientation of the soil cutting teeth as more effective in accomplishing these functions, but again the purpose of soil mixing was to make more effective use of an injected remediation agent.

A similar mobile trencher type machine is sold by Lang Tool Company, which supplies a variety of hydraulic tools with cutting teeth for various applications. One tool is a "Deep-Digger In-situ Blender". This tool is very similar to that of the '752 patent, and it too has an additive delivery pipe near the toothed blender head to inject wet or dry remediation reagents. Like the '752 patent and '693 patent, it does not teach vertical blending as the mode of remediation.

The Examiner is correct that the New Jersey document teaches that blending contaminated soil with clean soil is an acceptable remediation in certain cases, but as described above, the New Jersey document does not teach or suggest that the blending be accomplished by vertical mixing with clean soil from below the contaminated layer.

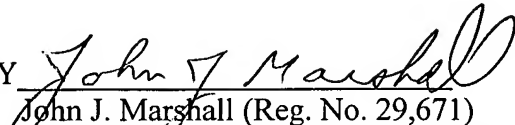
Thus, there is nothing in either Bruso '752 or the New Jersey document (the basis for rejection) that would motivate one of ordinary skill to use the modified trencher of Bruso to remediate soil d by vertical blending.

The NSW document does teach remediation by blending using vertical mixing of a contaminates surface layer with clean soil below. However, it also would not motivate one of ordinary skill to use the modified trencher of Bruso '752 for that purpose. The NSW document teaches that vertical mixing is only an effective method for shallow depths of contamination and mixing, suggesting that 0.5 metre is the practical limit of mixing depth.

Claim 1 has now been amended to recite that the mixing is done with a mobile\_trencher apparatus modified to lift and churn soil in place to a depth of at least four feet. Independent claims 11, 12 and 13 have been similarly amended. Consequently, this ground for rejection should be withdrawn.

Claims 1, 4 and 5 were rejected as obvious over Brewer '789 in view of the New Jersey document. Brewer does not disclose a mobile\_trencher apparatus modified to lift and churn soil in place to a depth of at least four feet. The soil introduced into the Brewer device is deposited into a storage hopper 12 by some undisclosed machinery, most likely a power shovel. The device mixes soil from the storage hopper with treatment reagents, and discharges the soil/reagent mixture to the ground from a ejection conveyor. In view of the arguments made above with respect to the New Jersey document and the NSW document, it is clear that there would be no motivation to use the Brewer device for vertical mixing. Consequently, this ground for rejection should be withdrawn.

The amended claims are believed to be in condition for allowance, and a notice of allowance is respectfully requested.

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